

Foxboro CNI Remote FoxView

David Johnson
EOSYS

Rick Targosky
Westlake



David Johnson

Director of BD DCS and Process Industries

EOSYS Group



Rick Targosky

Engineer Sr.

Westlake



AGENDA

- CNI use, per Schneider
- How this was hatched
- History at Westlake
- How it was implemented
- Stumbling blocks and lessons learned
- Network Implementation
- Q & A

What Westlake Wanted

Back in the Unix days, there was a product called Exceed on Demand.

Once that died out we developed Aspen Graphics.

Our new plant manager wanted the old functionality back.



What Westlake Knew

Somewhere along the way I was told about the Control Network Interface.

The CNI has been around since 2017 but doesn't appear to have sold a lot.

It wasn't heavily marketed for this application, but the functionality was there.



WHY YOU SHOULD CARE! THIS IS A BIG DEAL!!!

- ✓ A view-only cyber secure node!
- ✓ No special environment changes!
- ✓ No graphics changes!
- ✓ No possibility of an OMSET, even if you get out of the Foxview sandbox!
- ✓ You can even restrict what can be viewed!
- ✓ For the price, it's a good value!

A photograph of an industrial power plant or construction site at sunset. The scene is dominated by silhouettes of workers and large machinery against a bright, orange-hued sky. The sun is low on the horizon, creating a strong lens flare effect. The workers are positioned in the middle ground, and the machinery, including what appears to be a large crane or conveyor system, is in the foreground and background.

How Do I Interconnect Two Systems

Any One-to-One Connection of Foxboro Evo System or I/A Series System

August 21, 2017

Philip E. Knobel, P.E.

Agenda

Situation to Resolve

Our Solution

Configuration

CNI and Network Redundancy

Our Value to You

Customer Issue—Improve Plant's Control System Architecture

- **My system is too big!** Changes affect more than the portion of the system that is changing. A cyber-attack could defeat a large portion of the plant's continuing operation.
- **My system is too big!** Failures can propagate beyond the location of the first failure. My company and my regulators are taking steps to provide for assurance that the operation continues.
- **I have too many small and uncoordinated systems!** I need a way to coordinate the operation of the extended plant, even though the smaller systems are at different versions.

Our Solution

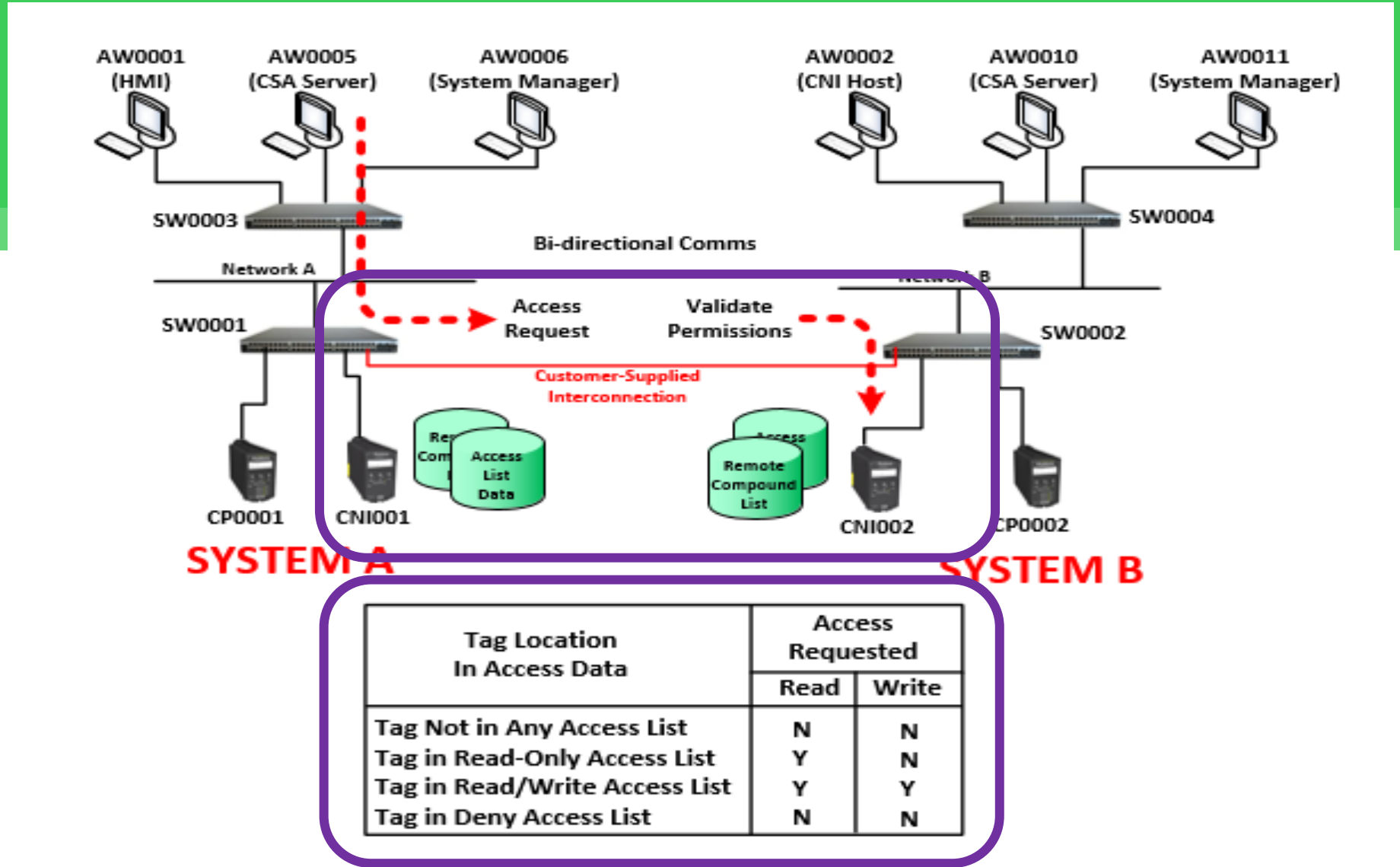


Partition the large system into smaller systems. Use the CNI to support communication between the new smaller systems.

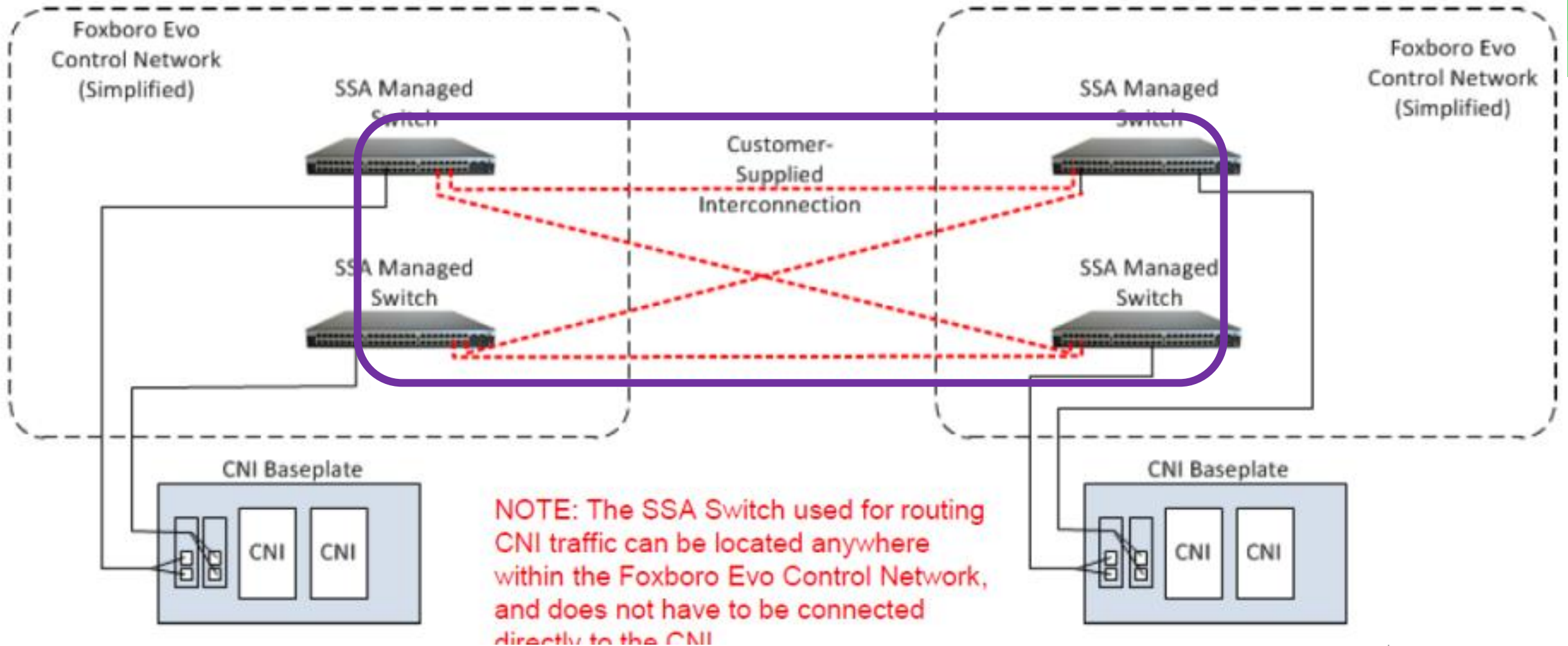
Combine several smaller systems into one large system. Use the CNI to provide operational information between pairs of systems. Otherwise, keep the smaller systems independent.

Our Solution

The whole project was Extreme switch config and understanding what was in the Customer-Supplied Interconnection.



CNI Platform and Network Redundancy



Our Value

Directly Calculated Economic Return

- Reduce ongoing maintenance labor
- Reduce the effort to conduct an upgrade within the installed

Improved Operational Assurance

- Necessary information is provided at point of use (support Situational Awareness across the plant)
- Reduce the propagation of network failure or cyber-attack

Life Is On

Schneider
Electric

Project History from EOSYS

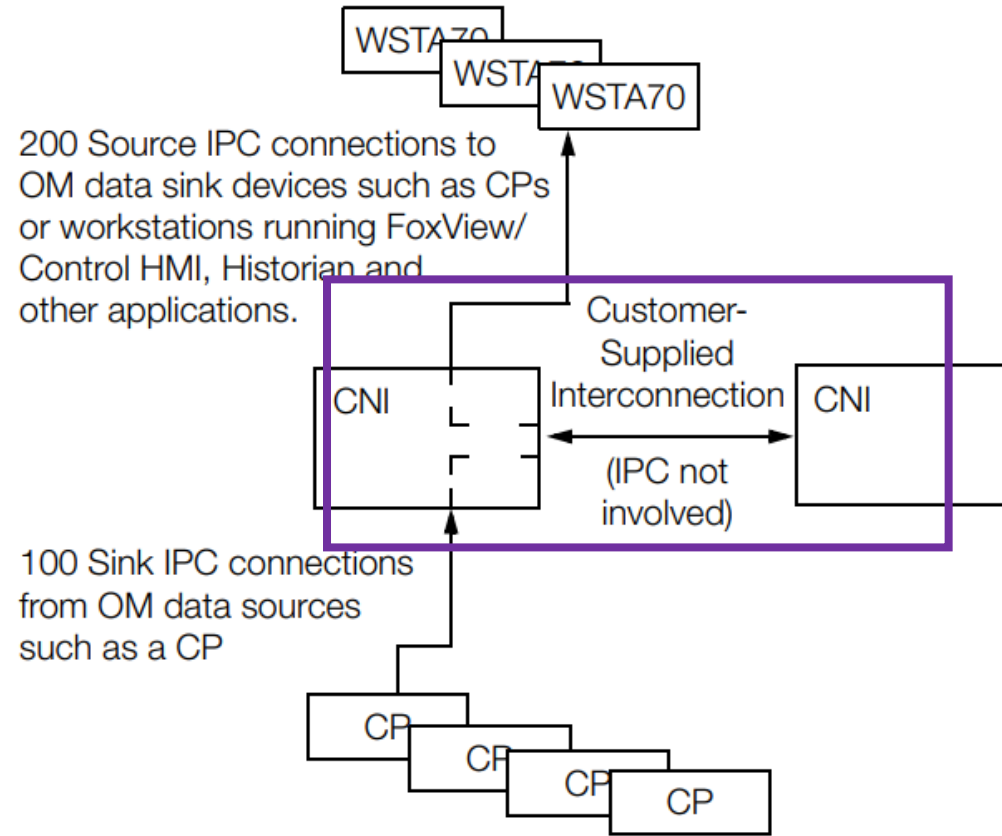
FIRST Rick calls, asks if I know about CNI. I say no, I'll call around.

NEXT Alex Johnson, says "That's a great use of a CNI." Although he's never actually used one.

THEN I sign us up – how hard can this be?

Project History from EOSYS

I read the manual b0700ge Rev L



Project History from EOSYS

From the manual b0700ge Rev L

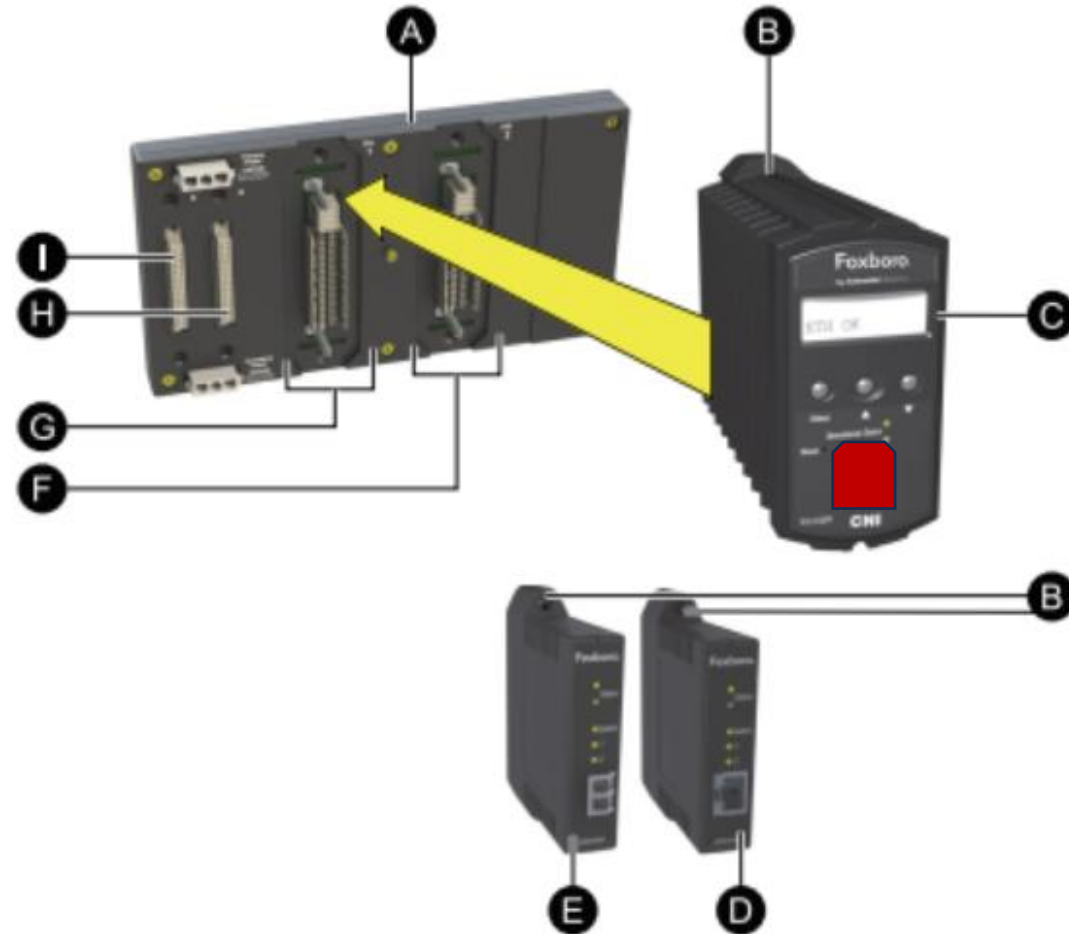


Project History from EOSYS

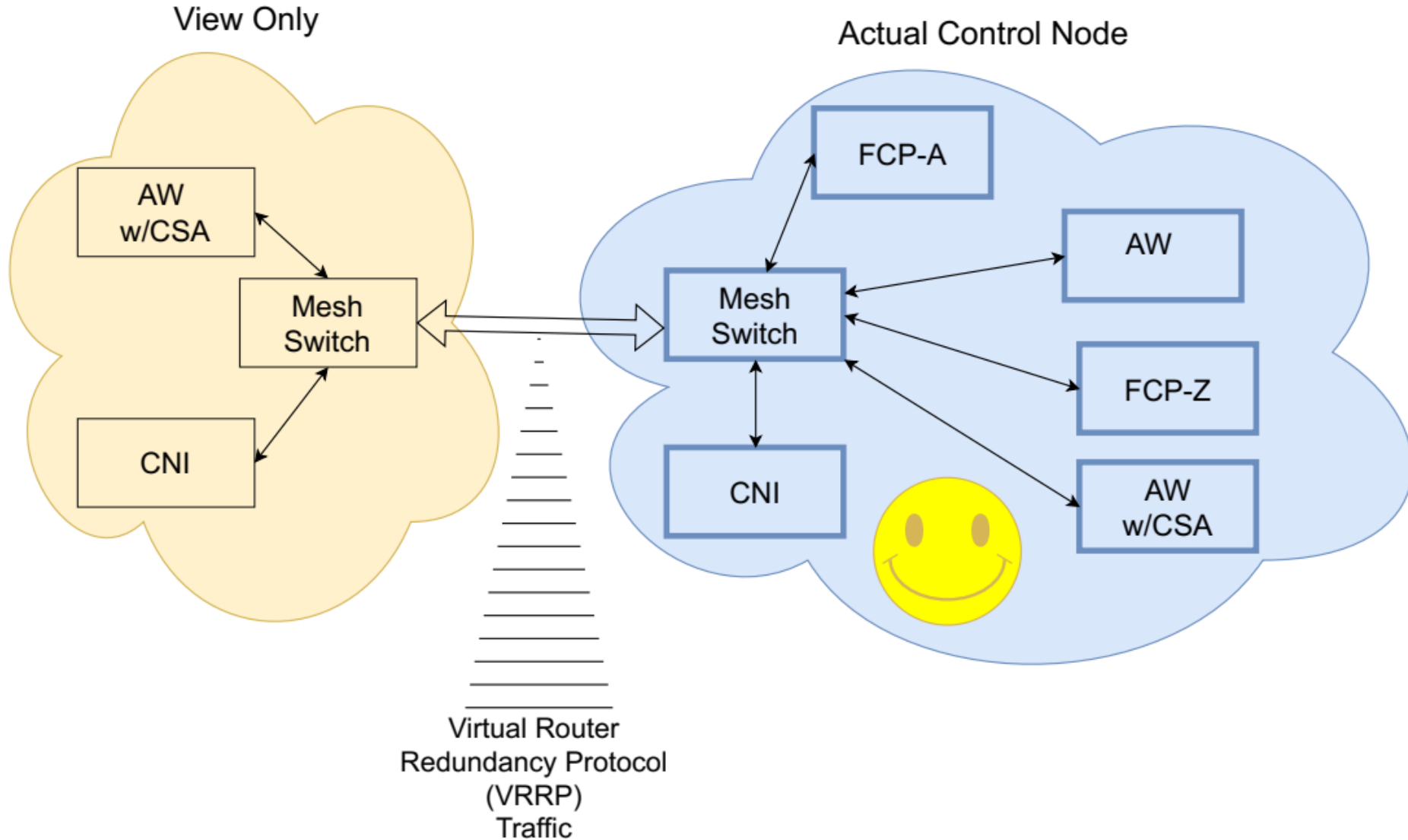
We get
the pieces.

What's
missing?

Figure 9 - CNI Module Installation (Typical)



Project History from EOSYS



Project History from EOSYS

Without going through the Mesh Switches, there was no way to connect a CNI to a CNI. It took Alex Johnson to get us over this hurdle.

The switches provide a VRRP tunnel that the CNIs can communicate through.

The documentation does not explain HOW the CNIs communicate or HOW to do it. It needs to be rewritten.

It throws you into the switch book with no explanation of WHY or WHAT.

Project History from EOSYS

You must have the “right” switches.

You must have the “right” switch firmware. And no, not just the LATEST FIRMWARE.

If you are using an Extreme 440 (edge switch), you have to buy a license to turn on VRRP. ~\$2,500

If you are using an Extreme 460 (root switch), you don't have to purchase the additional license(s).

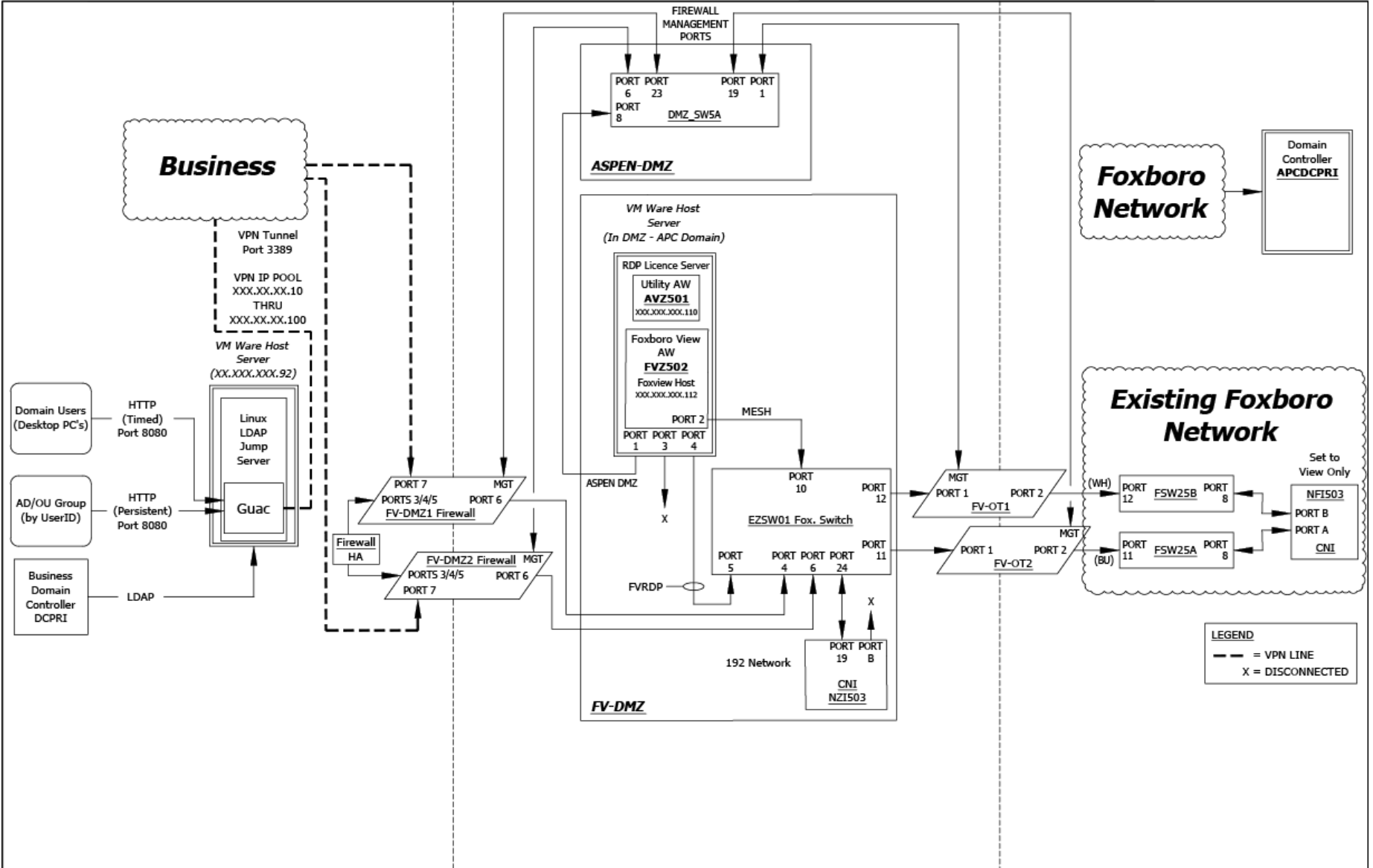
Project History from EOSYS

You must know HOW to set up the switches. The switch config tool is horrible.

It's not a "NORMAL" Foxboro vanilla switch configuration.

We added a Linux machine and installed GUACAMOLE with the sole purpose of doling out remote desktops to authorized users. It will authenticate the user to an LDAP server in the corporate domain. Based on this, it will start the appropriate Foxboro desktop and send it to a browser.

The Configuration



Project History On-site

Even with a Palo Alto firewall installed, initial connections caused a smurf out of the production side.

After that issue was resolved with some switch setup, the Master Time Keeper (MTK) traffic still leaked through from one mesh to the other mesh, causing issues.

Then, after more switch set up, everything worked as advertised.

500 Compounds – Read only from multiple CPs with good throughput!

Requested Enhancements

Currently, historian data is not passed through the CNIs. We'd ultimately like to be able to pass the data read-only to the View Only Node.

Improve the switch configuration software.

Improve the documentation – it needs a “**how it works**” and a lot of meaningful configuration explanations.

OR! Add another Ethernet Port and the ability to connect CNI to CNI without connecting the mesh switches!

QUESTIONS?



A person wearing a white hard hat and a high-visibility safety vest is seen from behind, sitting at a workstation in a control room. The workstation features several computer monitors displaying various data and charts. The person is looking at the screens. The entire image has a purple overlay.

THANK YOU!



SMALL HEADER

KEY POINT
CALLED OUT



SIMPLE DIVIDER





BACKGROUND DIVIDER



MORE DIVIDERS



ANOTHER DIVIDER



LIST WITH CHECKS

List of items

List of items

List of items

List of items

List of items

SPLIT SLIDE

Header: Info

Header: Info

Header: Info

Header: Info

Header

- List of things
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HEADER OF KEY POINT

Write a short sentence or two of copy here, **highlighting in blue** the one key takeaway.



KEY LIST OF POINTS WITH ICONS



HEADER

Short stuff to say here,
no more than two lines



HEADER

Short stuff to say here,
no more than two lines



HEADER

Short stuff to say here,
no more than two lines



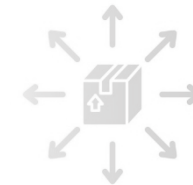
HEADER

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CHART SLIDE

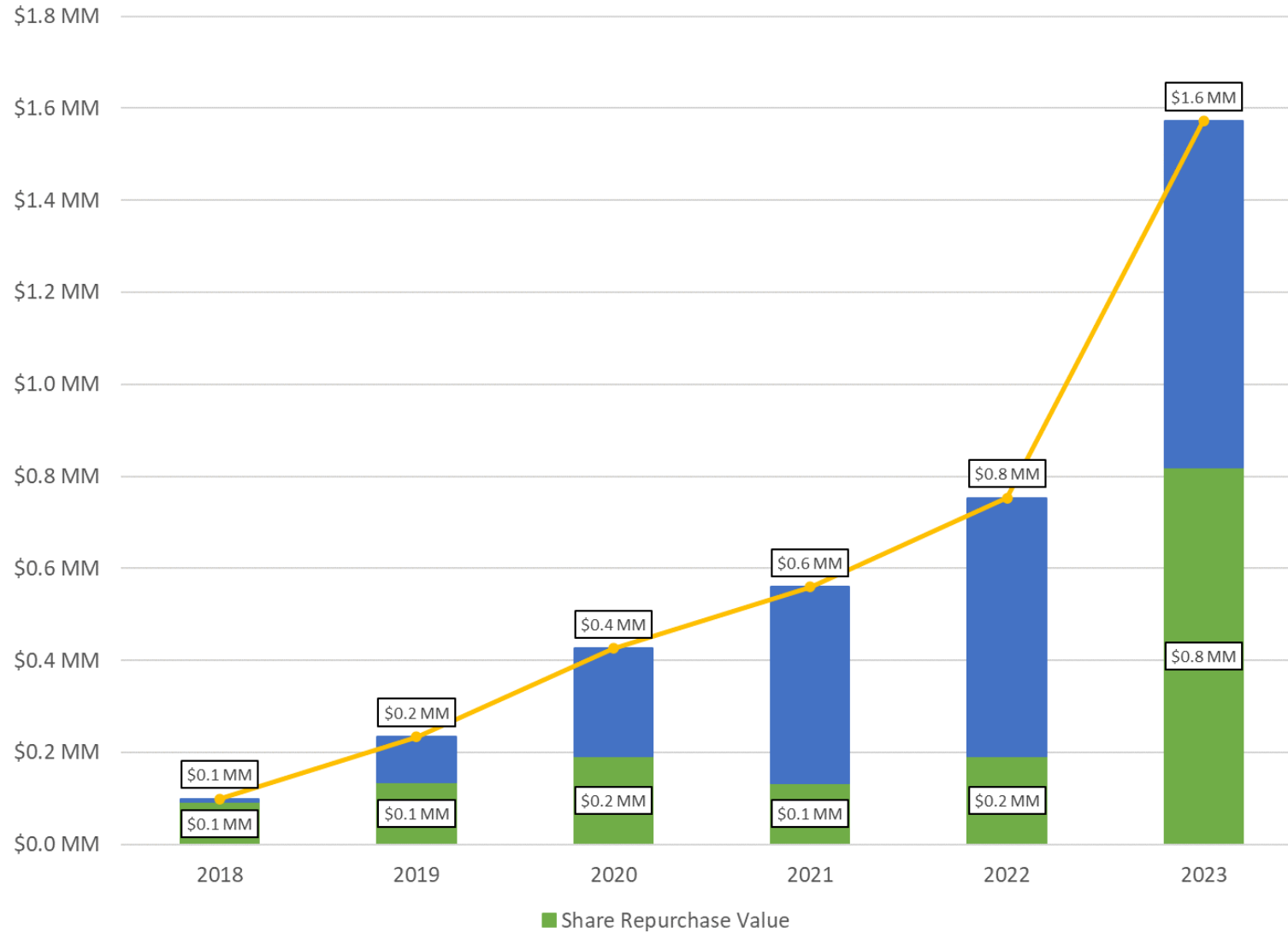
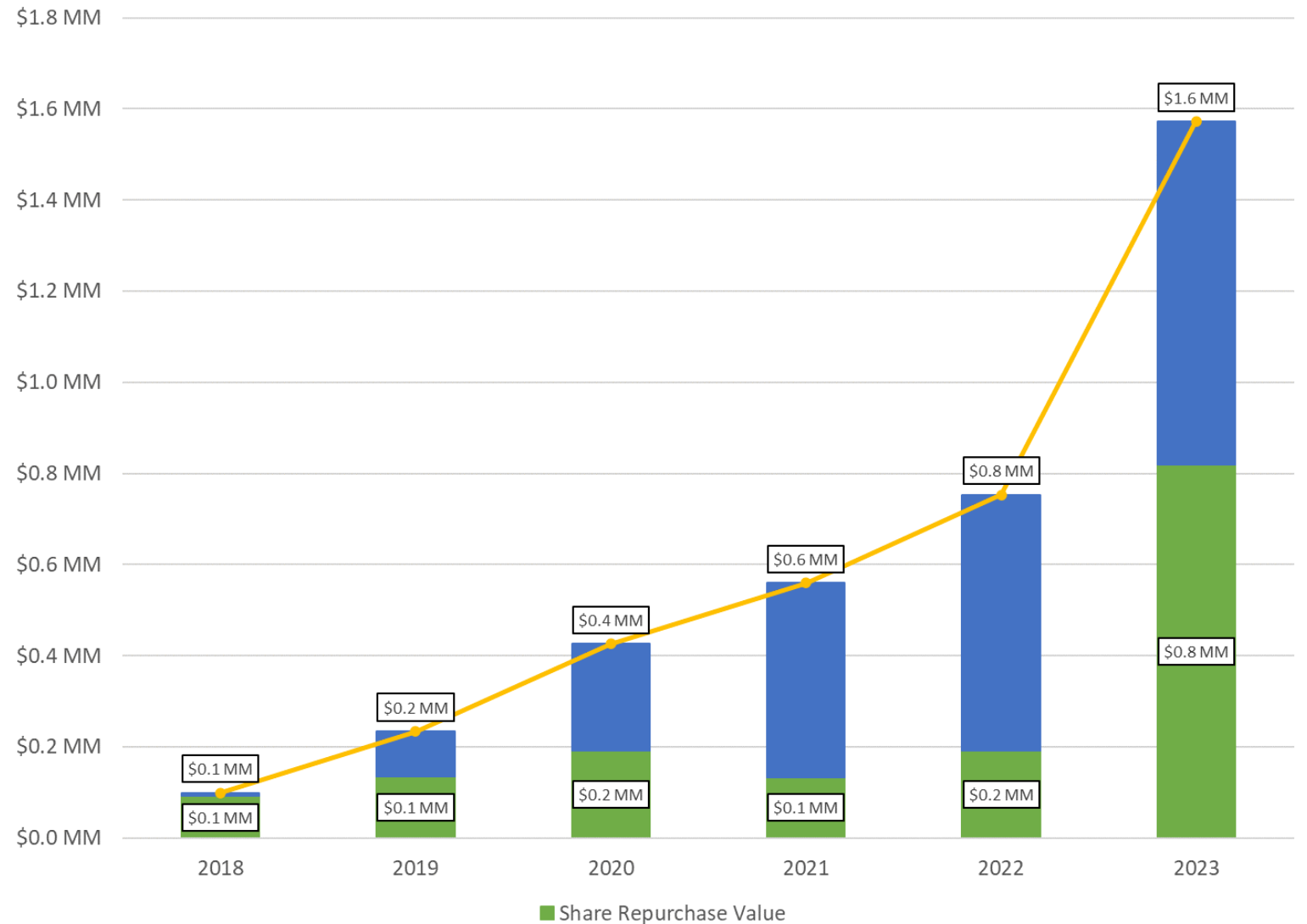


CHART WITH KEY TAKEAWAY

Key takeaway you want audience to get from this chart



TABLES

Great slide to use when you have some kind of table of information, and one sentence to explain it here.

TBD	TBD		
TBD	TBD	TBD	TBD
TBD	TBD	TBD	TBD
BE TBD			

TABLE WITH DEEPER INFO

Overview sentence here about what you're sharing

HEADER	Section Header	Section Header	Section Header	Section Header
List List List List List	Intro sentence or phrase goes here <ul style="list-style-type: none">• List• List• List• List• List• List• List• List	Intro sentence or phrase goes here <ul style="list-style-type: none">• List• List• List• List• List• List• List• List	Intro sentence or phrase goes here <ul style="list-style-type: none">• List• List• List• List• List• List• List• List	Intro sentence or phrase goes here <ul style="list-style-type: none">• List• List• List• List• List• List• List• List

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TABLE

	HEADER	HEADER
Name	Info here	Info here
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Name	Info here	Info here

GIANT LIST TO SHOW LOTS OF THINGS

SECTION HEADER

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HEADER HERE

OVERVIEW SENTENCE HERE

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SUBHEAD

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SUBHEAD

WRAP UP OF LOTS OF INFO ON ONE PAGE

Header

Subhead

Information here

Numbers

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Number

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Number

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Number

List of Things

1. List
2. List
3. List
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Header

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Group 4

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FLOW OF INFO

1

HEADER

Subheader phrase.

Short sentence that explains this step in greater detail but not too much.

2

HEADER

Subheader phrase.

Short sentence that explains this step in greater detail but not too much.

3

HEADER

Subheader phrase.

Short sentence that explains this step in greater detail but not too much.

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Short sentence that explains this step in greater detail but not too much.

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HEADER

Subheader phrase.

Short sentence that explains this step in greater detail but not too much.

SLIDE WITH A LOT OF COPY

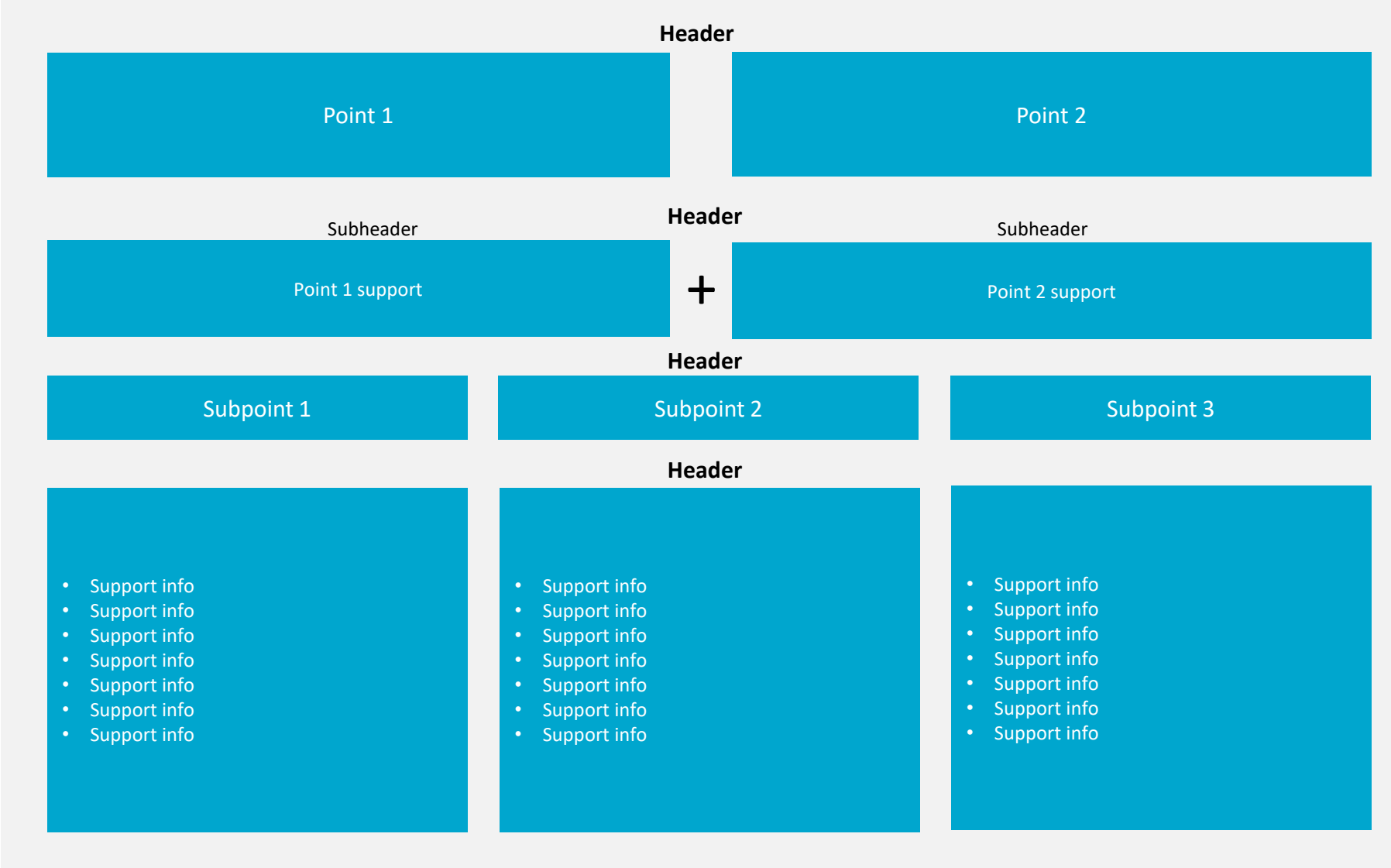
When you have some sort of long form copy to communicate, use a slide like this.

It should be used sparingly because **too many words on a page is impossible to take in** and usually loses your audience. They don't want to read your presentation, they want to hear/see you give it.

Typically, it's best if you only have 1-2 (max) slides like this one in a deck.

When you do use this, **highlight the key points in blue** so if they were to take away nothing but those points on a slide, they would still get the message you're trying to communicate.

DOWNWARD FLOW OF INFORMATION



HEADER

Key Takeaway Sentence Here

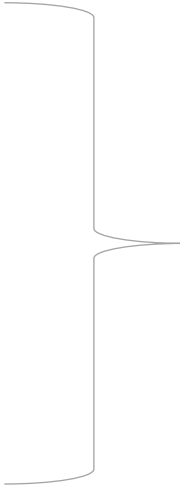
Section 1



Name

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Key takeaway sentence here



Section 2

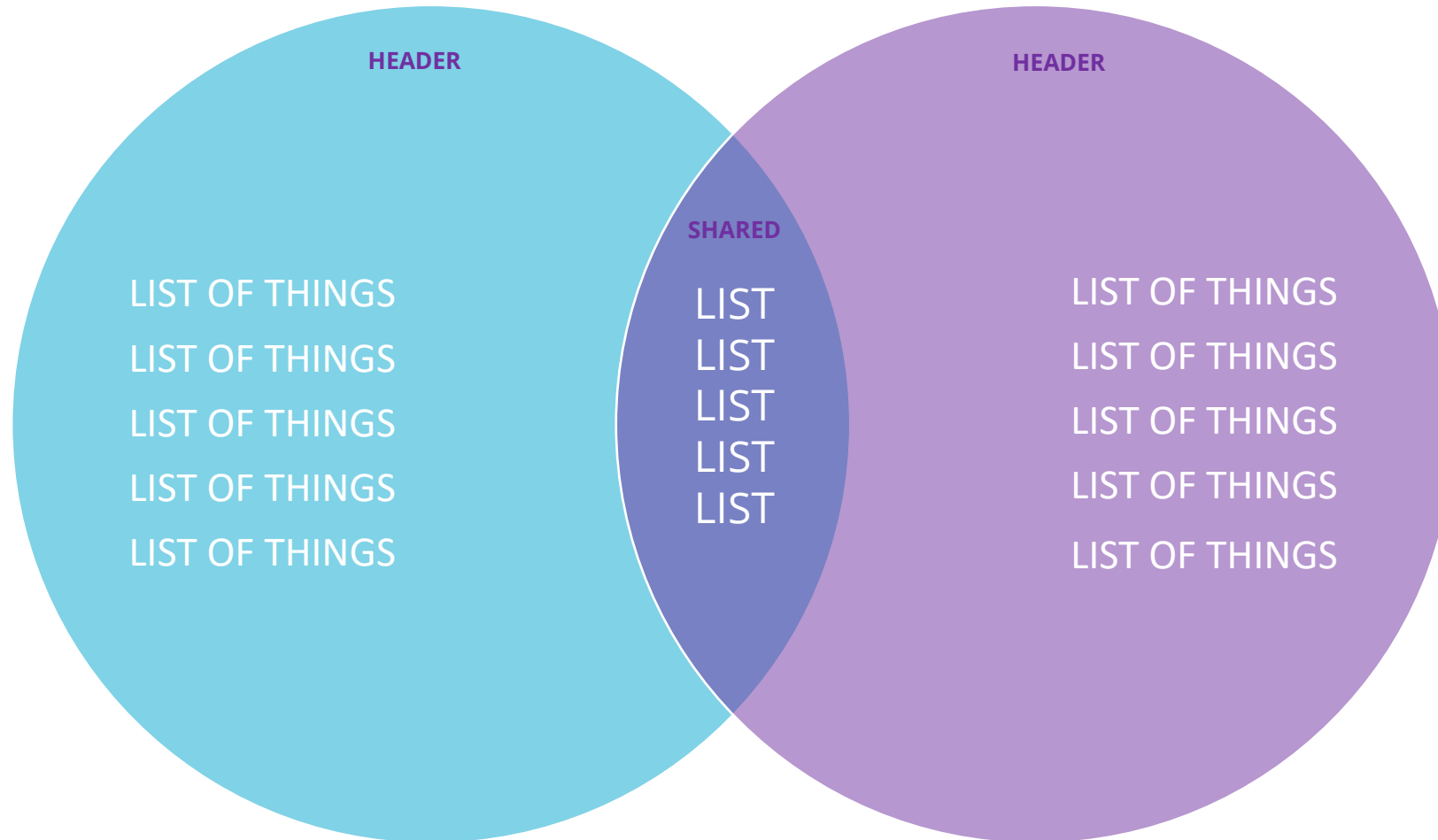


Name

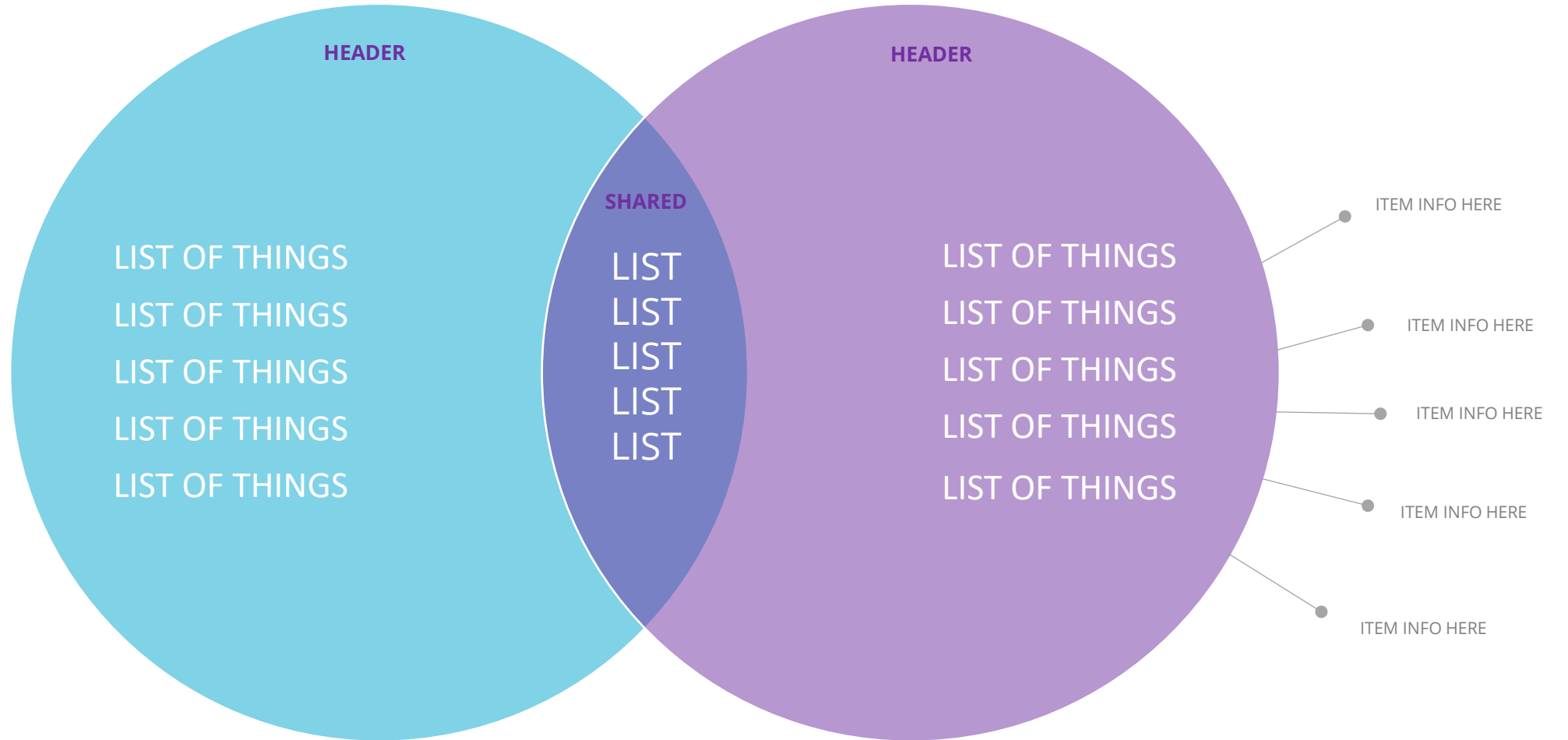
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Key takeaway sentence here

VENN DIAGRAM



VENN DIAGRAM WITH CALL OUTS



TWO BLOCKS OF INFO



HEADER

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HEADER

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IMAGES + KEY TAKEAWAY



Key Takeaway
from Image

RESOURCE ITEMS FOR GENERAL USE

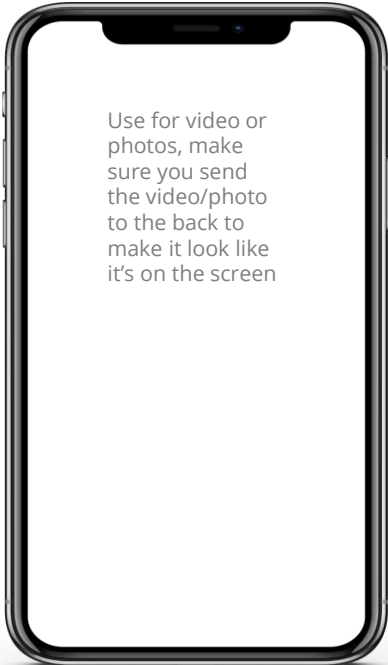
HEADER

HEADER

CIRCLE

CIRLCES

CONNECTED



GET IN TOUCH



Name
COMPANY
Email@Email.COM



Name
COMPANY
Email@Email.COM\



THANK YOU!

